UNIVERSITI PUTRA MALAYSIA

APPLICATION OF COST OF QUALITY SYSTEM BY PROTON VENDORS

LIM JOO ENG

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By

LIM JOO ENG

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia in Fulfilment of the Requirement for the Degree of Master of Science

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In delication to

my beloved husband, Michael Tan

and two loving sons, Ying Hong and Dao Hong

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Master of Science

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March 2003

Chairman: **Associate Professor Md. Yusof Ismail, Ir. Ph.D.**

Faculty: **Engineering**

Globalization is one of the key trends in the business world today. When countries around the globe open their markets upon the implementation of economic integration which may include European Unification (EU) in Europe, North American Free Trade Agreement (NAFTA) for North America, Asia Pacific Economic Corporation (APEC) for Asia Pacific region, Asean Free Trade Area (AFTA) for Asean countries, industries are now faced with new competition. To survive in this global business arena, organizations must increase their competitiveness not only in terms of cost, but it would also be driven by criteria involving quality, reliability, delivery and technology competency. Often companies respond to this highly dynamic business environment by implementing total quality management (TQM). TQM approach focuses on process improvement and the elimination of all forms of waste. One of the key and effective tools to ensure the success adoption of TQM is cost of quality (COQ). Cost of quality system translates quality problems into a common denominator – money, a financial term that is what management sought of to indicate the

economic health of the organization. Whilst cost of quality is a common subject and has been focus by organizations in the West, its concept is still fairly new to the industries in Malaysia. In view of this and a list of recognized benefits after instituting a COQ system, an industry survey by postal questionnaire has been initiated to study and evaluate the application and use of the COQ program in Proton vendors, the automotive manufacturing industry in Malaysia. A total of 154 vendors listed in the Proton Vendors' Directory 2000/2001 have been selected as the target group for this survey. The methodology used in the survey is described and the key results obtained are analyzed. The survey found that majority of the automotive manufacturers in Malaysia are small and medium enterprise. This reflects the government's policy to promote and encourage more entrepreneurship in small and medium industry through the various assistance program offered by the government agencies. The industry, generally, is aware of the importance of quality issues, and management is committed to the quality management system as most of them have achieved their certification of ISO (International Standards Organization) standard. However the awareness and understanding of COQ concepts are still lacking. In measuring COQ activities, prevention cost appears to be the most focus area of measurement compared to appraisal cost, internal and external failure cost. The survey showed a considerable wide variation in the total cost of quality (TCOQ) figures. However, one significant trend observed, the TCOQ presented by the industry is either very low, at less than 5% or they are unable to provide any figures to the quality-related expenditure. Finally the industry as a whole agreed that COQ is an effective tool to improve their business performance and they strongly indicate

there is need to develop a conceptual framework for the effective implementation of COQ program.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

APLIKASI KUALITI KOS SISTEM DI GOLONGAN PEMBEKAL PROTON

Oleh

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Globalisasi adalah salah satu kaedah utama dalam sektor perdagangan masa kini. Apabila negara-negara di seluruh dunia membuka pasaran terhadap perlaksanaan ekonomi integrasi yang melibatkan Europe Unification (EU) di Eropah, North American Free Trade Agreement (NAFTA) untuk Amerika Utara, Asia Pacific Economic Corporation (APEC) untuk negara di lingkungan Asia Pacific and Asean Free Trade Area (AFTA) untuk negara-negara di rantau Asia, industri masa kini sebenarnya sedang berhadapan dengan persaingan baru. Untuk terus kekal di dalam arena globalisasi perdagangan ini, sesebuah organisasi mestilah meningkatkan daya saingan mereka bukan saja dari segi kos, tetapi termasuk juga pelbagai kriteria yang melibatkan kualiti, daya ketahanan, penghantaran dan saingan teknologi. Lazimnya, sesebuah syarikat akan menyahut kepada suasana perdagangan berdinamik tinggi ini dengan melancarkan program pengurusan kualiti keseluruhan atau dalam bahasa Inggeris 'total quality management (TQM)'. Pendekatan TQM memfokuskan kepada proses baik pulih dan

penghapusan semua bentuk bahan buangan. Salah satu kunci dan cara yang berkesan untuk memastikan kejayaan dari perlaksanaan TQM ialah kualiti kos, atau 'cost of quality (COQ)' dalam bahasa Inggeris. Sistem kualiti kos ini akan memindahkan masalah kualiti kepada ukuran biasa; iaitu wang di mana ianya digunakan untuk menunjukkan keteguhan ekonomi sesebuah organisasi. Walaupun sistem ini adalah perkara umum dan telah pun difokuskan oleh banyak organisasi di Barat, perlaksanaannya kepada industri di Malaysia boleh dikatakan masih awal. Sehubungan dengan ini dan juga merujukkan kepada senarai kebaikan yang telah dikenal pasti selepas perlaksanaan sistem kualiti kos, satu kajian industri melalui borang kaji selidik telah diikhtiarkan untuk mengkaji dan menilai perlaksanaan program COQ di golongan pembekal Proton, industri pembuatan automotif di Malaysia. Seramai 154 pembekal Proton yang nama syarikatnya disenaraikan dalam 'Proton Vendors Directory 2000/20001' telah dipilih sebagai kumpulan sasaran untuk kajian ini. Kaedah yang digunakan di dalam kaji selidik dihuraikan dan hasil yang diperolehi juga di analisa secara terperinci. Hasil kajian telah mendapatkan bahawa sebahagian besar daripada pembekal komponen automotif di Malaysia adalah terdire dari golongan usahawan kecil dan sederhana. Ia menggambarkan polisi kerajaan untuk memupuk serta menggalakkan lebih banyak usahawan dalam industri kecil dan sederhana melalui pelbagai program bantuan yang ditawarkan oleh agensi kerajaan. Industri pembuatan kereta secara amnya sedar akan kepentingan isu kualiti, dam pengurusan di syarikat mementingkan sistem pengurusan kualiti dimana kebanyakannya telah mencapai sijil ISO. Walau bagaimanapun kesedaran and pemahaman mereka terhadap konsep COQ masih kurang. Dalam

menjalankan pengukuran COQ, kos 'prevention' telah muncul sebagai kategori kos yang paling diutamakan dibandingkan dengan kos 'appraisal', kos-kos 'internal' dan 'external failure'. Kajian juga menunjukkan bahawa nilai ukuran kualiti kos keseluruahn di industri agak jauh berbeza. Tetapi, satu corak yang ketara telah diperhatikan, nilai kualiti kos keseluruhan yang dipamerkan oleh industri samada nilainya rendah,, iaitu kurang dari 5% atau mereka langsung tidak dapat menganggar nilai tersebut. Akhir sekali, industri ini secara keseluruhan bersetuju bahawa COQ adalah satu teknik yang berkesan untuk meningkatkan mutu perniagaan mereka. Mereka juga tegas memperkatakan tentang perlukan pembangunan satu konsep rangka kerja untuk perlaksanaan program COQ yang berkesan.

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I certify that an Examination Committee on 12th March 2003 to conduct the final examination of Lim Joo Eng on her Master of Science thesis entitled "Application of Cost of Quality System By Proton Vendors" in accordance with Universiti Pertanian Malaysia (Higher Degree) Act 1980 and Universiti Pertanian Malaysia (Higher Degree) Regulation 1981. The Committee recommends that the candidate be awarded the relevant degree. Members of the Examination Committee for the candidate are as follow:

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This Thesis submitted to the Senate of Universiti Putra Malaysia has been accepted as partial fulfilment of the requirements for the degree of Master of Science. The members of the Supervisory Committee are as follows.

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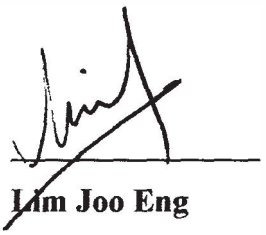
DECLARATION

I hereby declare that the thesis is based on my original work except for quotation and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.



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LIST OF ABBREVIATIONS/NOTATION/GLOSSORY OF TERMS

Unless otherwise stated, the following symbols are used throughout the dissertation

ABC	Activity-based costing
ASQC	America Society for Quality Control
A/C	Account
CIMA	Chartered Institute of Management Accountants
COC	Cost of conformance
CONC	Cost of non-conformance
COQ	Cost of quality
DIS	Draft International Standard
GAO	Government Accounting Office
ISO	International Standard Organization
JIT	Just in time
MAA	Malaysia Automotive Association
MNC	Multinational Corporation
NPC	National Productivity Center
OBP	Operational business performance
OEM	Original equipment manufacturer
PAF	Prevention, appraisal and failure
POC	Poor quality cost
PoC	Price of conformance
PoNC	Price of non-conformance
PPP	Persatuan Pembekal Proton

PROTON	Perusahaan Otomobil Nasional
PSB	Singapore Productivity and Standard Board
QA	Quality assurance
QS90000	Quality Standard 9000
RM	Ringgit Malaysia
SBP	Strategic business performance
SIRIM	Standard Industrial Research Institute Malaysia
SMI	Small and medium industries
SMIDEC	Small and Medium Industry Development Corporation
SPC	Statistical process control
TCOQ	Total cost of quality
TQLF	Taguchi Quality Loss Function
TQM	Total quality management
U K	United Kingdom
U S	United States
VDA	Verband De Automobileindustries
VDP	Vendor development program

CHAPTER 1

INTRODUCTION

1.1 General

Globalization is one of the key trends in business world today. With international competition growing more intense and business operation costs continue to rise, organizations around the world will find it increasingly difficult to compete on price alone. Customers are consistently demanding higher quality while suppliers strive to reduce operating cost to remain profitable. To survive in this highly dynamic and competitive business environment, organizations must satisfy customer with quality product and services and maintain cost competitiveness at the price that represent the best value in the market.

Quality therefore has become an important strategic dimension and a key competitive weapon that cannot be ignored. Often companies respond to the changing environment and customers quality demand by implementing Total Quality Management (TQM). TQM focuses on process improvement and the elimination of all forms of waste. One of the key tools that could help organizations to achieve this goal in TQM program is Cost of Quality (COQ).

Cost of quality, a tool advocated by both Feigenbaum and Crosby, is an essential part of quality improvement program (Porter and Rayner; 1992; Goulden and Rawlins, 1997). It presents quality program and activities in a way which management understands – money, a common performance indicator that helps

managers to justify specific quality improvement efforts and formulate policy concerning quality issues (Low and Henson, 1998). Cost of Quality provides a mean to gauge the return on quality in an organization, and how this return impacts the bottom line. It can serve as a useful platform to reduce business costs and increase competitiveness both in domestic and export market (Primer on Cost of Quality, 1998).

COQ is also a measure of company's performance with respect to the process by which the product is produced or the service is delivered. An organization's competitiveness is seriously eroded by the costs of correcting errors, redoing thing and apologizing to customers. It is reported in survey studies by researchers in various industries that the quality cost of these nonproductive activities has been estimated to be as high as between 20 to 40 percent of an organization's total sales revenue (Maycock and Shaw, 1994; Giakatis et al., 2001). It was also found that a well-planned and successful cost of quality program could reduce the cost of quality significantly to 2.5% of total sales turnover (Superville and Gupta, 2001; Ian, 1999; Kumar and Brittain, 1995).

In view of the significant reduction of poor quality costs, many positive implication and potential benefits that cost of quality can bring to an organization, a realistic estimation of quality cost is, therefore, an important activity in implementing any TQM program.

1.2 Research Need

Despite a large volume of literatures written on the importance and principles of cost of quality, only a minority of organizations uses the formal method of quality cost. The literatures on quality (Mandal and Shah, 2002; Giakatis and Rooney, 2000; Kumar and FitaRoy, 1998; Kumar and Brittain, 1995; Porter and Rayner, 1992) highlight that very few firms report quality cost and use these data for management control purpose. Manufacturing organizations usually neglect this aspect, and a large proportion of firms do not even collect and report quality control cost systematically. Skepticism about its use and the real strengths still continues.

Though cost of quality is still not widely adopted in organizations, its implementation has started to bear fruit, in the form of higher level of awareness on quality issues and significant reduction of cost of poor quality. Indeed, it has now becoming a more common subject and focus particularly to the organizations in the West. Singapore, via its government agency, Singapore Productivity and Standards Board (PSB) has introduced a national program and set aside S40million to assist organization in managing the COQ program effectively (Primer on Costs of Quality, 1998; Harrington, 1999)

The application of cost of quality in the automotive industry showed that there are quite a number of studies carried out in this sector of industry In Germany, investigation showed that 10-35% of the electrical, machine and automotive industry have implemented quality cost as an instrument for permanent control

(Vocht, 1989). Lascelles and Dale (1990) found that 42% of the firms under surveyed claimed to measure quality cost in the automotive industry. Prickett and Rapley (2001) found that the use of quality costing is particularly prevalent in the manufacture of office machinery, data processing equipment and the manufacture of motor vehicle and parts. In a case study reported by Giakatis and Rooney (2000), cost of quality is used as a tool to trigger the process improvement. Prevention-appraisal-failure is the approach used to categorize the quality cost and provide information for the improvement activities of the organization. The result of the findings showed that the company has improved its performance significantly. First, the response is faster in case of malfunction and the time taken to detect a non-value added activity has also decreased. Inefficiencies are identified and improvement measures are taken immediately during the process analysis. Information provided is further used for future improvement initiatives. Another benefit that has been achieved is that quality has been promoted as a factor in the daily life of business as well as in the strategic level. The bottom-up and top-down communications concerned quality issues become easier.

Whilst cost of quality is gradually gaining its popularity and becoming a quality initiative emphasized by organizations, its concept and the application is still fairly new to the industries in Malaysia. A search of literature on the cost of quality studies in Malaysian industries found there is an article reported by Hamzah (1997) on some observation on the issues of quality cost in construction industry None has been found related to issues in the automotive industry.

In view of the significance and lists of benefits that COQ has brought to the automotive industry in the West, a study on the application of cost of quality in the Malaysia automotive manufacturing industry has been initiated.

Proton vendors have been selected to participate in this study as it is the largest car manufacturer in the country. Since its inception in 1985, it has been the market leader and still enjoys a strong market share of 52.2% in the local vehicle market (Malaysia Automotive Association, MAA, 2001). Proton has since developed a wide base of strong and capable vendors under its Proton Vendor Development Program (VDP). They are the component manufacturers and supply hundreds of parts to Proton for its final assembly. It is also common that vendors to Proton are also supplying parts to other local automotive assemblers such as Perodua, Modenas, Inokam, Toyota, Honda, Nissan and others. Thus, to study these groups of Proton vendors in a way is a fair representative of the automotive industry in Malaysia.

This study should provide a useful insight into the present practice, the application and use of quality cost system among the Proton vendors It helps to draw management's attention and interest regarding the need for a cost of quality program and use it as an integral part of a total quality system for managing and improving work processes in the organization The study essentially will assist to increase, propagate and entrench the concept and significance of cost of quality throughout the industry